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Imaging

VALIDATING DICOM-BASED STRAIN IN THE ADULT AND PEDIATRIC POPULATIONS

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Background: : Strain (S) analysis allows robust evaluation of myocardial mechanics but clinical use requires validation of vendor-specific software. To test agreement of S values from images in native Polar (P) & processed DICOM (D) data, we compared same images in both formats in adult & pediatric patients.

Methods: 35 patients (6-66 years old, 13 pts 6-18 years) had echocardiograms with a General Electric (GE) Vivid 7 scanner: 17 normals, 18 cardiomyopathies. 4,3 & 2-chamber left ventricular (LV) apical views yielding 90 datasets were analyzed using EchoPAC (GE, version 10.8.1) in native P &Velocity Vector Imaging (VVI, Siemens, version 3.5) in D formats by 3 observers.

Results: : Global S showed excellent agreement between P & D (Pearson r=0.90, p<0.0001), with low inter- (r = 0.94 for EchoPAC, r = 0.96 for VVI, p<0.0001) & intra-observer (r = 0.96, p<0.0001 for EchoPAC & VVI) variability. D analysis had lower absolute S (mean ± SD for P-D = -2 ± 2.2%, p=0.02). Bland Altman analysis showed no systematic bias. Regional S (RS) had lower agreement than GS on an 18-segment LV model (Table 1). Inter-observer agreement was lower for RS (average r=0.64 for VVI, r=0.75 for EchoPAC, p 0.004 to <0.0001).

Conclusions: In adults and children, LV GS from DICOM images agree well with the source raw data with low inter/intra-observer variability. RS has lower agreement with higher inter-observer variability. Further standardization of analysis software is necessary.

Table 1: Regional Peak Systolic Longitudinal Strain Correlation

EchoPAC v.s. VVI Pearson 2-tailed Correlation, r (all p <0.0001)			
	Apical	Mid	Basal
Anterior	0.65	0.65	0.67
Anteroseptal	0.55	0.67	0.43
Inferior	0.74	0.83	0.60
Lateral	0.40	0.60	0.48
Posterior	0.43	0.60	0.40
Septal	0.74	0.70	0.53